Space Weather Forecast

Issued on Thursday, 11 May 2023 at 01:17 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2 Minor/Moderate geomagnetic storm conditions are likely on Day 1 (11 May), with a Slight Chance of G3/Strong storm. S1/Minor Solar Radiation Storm ongoing. Further R1/R2 Minor/Moderate radio blackouts expected.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate over the past 24 hours, with a Moderate flare observed at 10/1421UTC, originating from a large and magnetically complex sunspot region in the northwest quadrant. This region has produced several Moderate-class flares over recent days. This region was the source of the Moderate flare late on the 9th May, which subsequently produced a large Coronal Mass Ejection (CME) observed in coronagraph imagery. This has been analysed and is considered to be Earth-directed, with a likely arrival on Day 1 (11 May), probably late in the day. There is a second large sunspot region also located in the northwest quadrant, although this appears to be less active compared to aforementioned region to the west. The remaining sunspots on the disc appear to be relatively small and mostly stable. No other Earth-directed have been observed.

Solar Wind / Geomagnetic Activity: The solar wind has been at Elevated to Strong levels, reaching above 700km/s. The Interplanetary Magnetic Field (IMF) strength was Strong at the start of the period, before declining to the current weak levels, with the all-important north-south component mostly orientated northwards. The resultant geomagnetic activity was Unsettled to Active (Kp3-4), with a G1/Minor Storm (Kp5) interval observed at 10/0300-0600UTC, declining to mostly Quiet (Kp 2) at present.

Energetic Particles / Solar Radiation: Solar radiation remains above the S1 Minor Solar Radiation Storm threshold due to recent flare and CME activity from the large sunspot region located in the northwest.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate to High activity is likely to continue, with further M-flares likely and a slight chance of isolated X-class flares.

Solar Wind / Geomagnetic Activity: A large CME was observed in coronagraph imagery late on the 9th May, which was associated with Moderate flare originating from the largest and most magnetically complex sunspot in the northwest quadrant. The CME has been analysed and modelled, which suggests an arrival at Earth on Day 1 (11 May), probably late in the day (after 1800 UTC), although with some uncertainty. Earth is currently experiencing Strong solar winds, due to the effects of a weak CME, which arrived late on the 9th May. Solar winds are likely to remain strong or elevated during the coming days, due to the onset of a large CME. Geomagnetic activity is likely to be Quiet initially, before an enhancement to Unsettled or Active levels during Day 1 (11 May), increasing to G1-G2 Minor/Moderate Storm, probably late in the day, with a Slight Chance of a G3/Strong Storm. The effects of the CME are likely to persist into

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Days 2 and 3 (12-13 May), before waning into day 4 (14 May).

Energetic Particles / Solar Radiation: Solar radiation levels are likely to remain above the S1 threshold during the coming days, mainly due to the chance of significant flares from the largest sunspots in the northwest and the onset of the CME arrival on Day 1 (11 May), with effects lingering over the forecast period.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	60	40	10	5
Strong	G3	No	10	10	5	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	80	60	40	30
Very Active	R3 to R5 X	No	20	20	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	90	70	50	50
Very Active	≥ S3 *	No	5	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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